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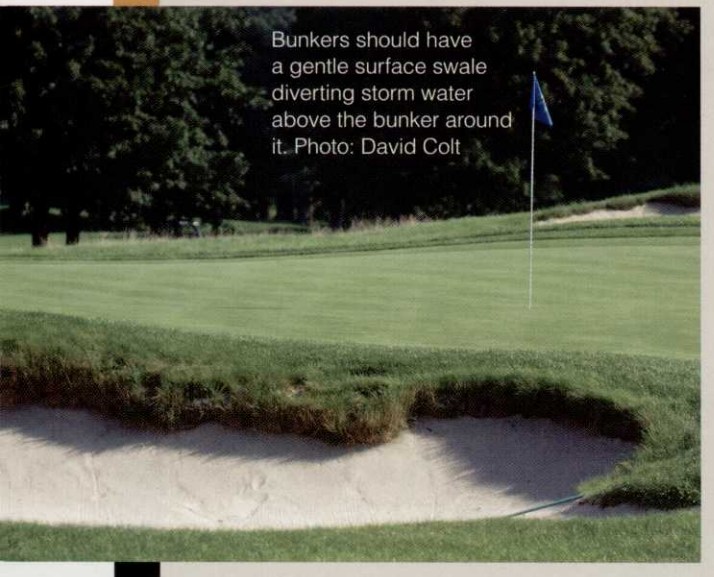
DRAIN BUNKERS BETTER

While a "perfect bunker" probably requires flat bunker slopes, liners and angular sands, improved drainage is the quickest route to better bunkers. Overall bunker drainage includes surface drainage above the bunker, interior drainage and disposing of drainage beyond the bunker.

Previous generations of golf course architects were meticulous, to a fault, about preventing surface water above the bunker from entering it. During the 1990s, designers, including yours truly, used bigger-scale support mounds that naturally created more drainage inflow to bunkers. As a result, tiles clog more frequently, and sand deteriorates more rapidly.

Newly constructed or reconstructed bunkers should have a gentle surface swale diverting storm water above the bunker around it. Ideally, no more than a few feet of bank should be allowed to drain into the bunker. The swale can be small, unless you routinely notice flow several inches deep in the area. At Colbert Hills Golf Course in Manhattan, Kan., Dave Gourlay and his crew improved bunkers by peeling back the sod and hand cutting 1-inch-deep swales.

Valleys in support mounding tend to concentrate damaging flow into bunkers. I add small catch basins above the bunkers at those valleys, or wherever slope or tight quarters make swales impossible, even tied into the main drain tile through the bunker, which is preferable to allowing overland flow into the bunker.



Bunkers should have a gentle surface swale diverting storm water above the bunker around it. Photo: David Colt

> Improving bunker drainage should enhance conditions considerably, regardless of whether you can afford to go all out ...

Interior surface drainage also is important. Concave shaping of a subgrade cavity with a 3- to 5-percent slope in flatter areas to a single low spot is preferable to building a flat bottom and steeper side slopes. Water should collect in one defined low area. Because most bunkers are built to collect water, interior subsurface drainage is critical.

The traditional, and minimal, 4-inch perforated drain in the bunker bottom is inadequate. Most golf course architects now use 6-inch perforated drains for low areas and exit pipes. Installing a horizontal drain box, or a 6-by-6-by-6 T fitting with a solid cap, allows crews to unplug the drain to open the system for quicker water removal after heavy rains.

Most golf course architects use a herringbone pattern of 4-inch perforated drains throughout the bunker. These patterns are similar to those in greens. Placement should be perpendicular to the flow, and spacing should allow water to keep a maximum flow to reach a pipe no more than 10 to 15 feet away. Tiles should reach to the top lip of the bunkers, which often requires hand digging trenches or, at the very least, some contorted trencher positioning.

By extending tiles above the bunker and creating an air vent, you'll increase air flow in the tile, which will increase water flow. (For a simple demonstration of this principle, fill a straw with water, plug one end with a finger and then let go.) This can be a small catch basin made with a T fitting and an open grate.

While I don't recommend using the old flexible PVC drain pipe, if you're using it you can simply bend the pipe vertically and place a plastic grate on it. Each bunker might have a few of these, and each air vent can double as a surface drain. This allows you to use a hose to flush out the pipe occasionally.

The added tile drainage at the top and bottom of bunkers helps maintain bunker sand quality. The upper tiles capture flow on slopes before it builds up speed down the slope. This reduces sand displacement and helps keep soil from moving down the slope with it. The larger tiles and emergency drain outlet caps in the low point reduce saturation, which keeps soil contaminants from floating back up into the sand in big rains. Both reduce the bunker's degree of soil contamination from fines mixing with the bunker sand.

The last essential component of bunker drainage is the outlet pipe, which must be laid with sufficient slope to be self cleansing to avoid repeated clogging. For corrugated PVC pipe, minimum slopes are about 1.25 percent for 4-inch pipe and 0.85 percent for 6-inch pipe. Open outlets function better than gravel drain sumps. If you're going to a pond or stream bank, locating the outlet above normal water level allows the pipe to function even when water rises. Where the tile also drains greens or turf and filtering runoff is required, the outlet pipe might have to run through filter chambers before exiting to its natural drainage outlet. For future reference, mark pipe connections with small surface catch basins and record them on as-built plans.

Improving bunker drainage should enhance bunker conditions considerably, regardless of whether you can afford to go all out with liners and imported bunker sand. **GCI**